

### Patent Claims

1. ~~Laser scanner measuring system~~ consisting of an emitter unit with a laser, a beam deflector unit and an optical emitter system, as well as

a receiver unit including a photo detector disposed in the focal plane of said optical system, which is provided for the receiving beam path,

characterised in

- that said scanner unit and said receiver unit are disposed on the same side relative to the object, and
- that the surface normal of said optical system of the receiver is parallel with the emitting direction of said scanner unit, which means that the beam paths of said scanner and said receiver in the outside space present the same optical axis at any point of time, or that the axes are shifted in parallel relative to each other and in a direction orthogonal on the direction of movement of the laser beam.

2. Laser scanner measuring system according to Claim 1

characterised in

that at least one retro reflector or a retro reflecting marker are disposed inside said scanner unit in the zone between the beam deflection system and the beam emergence site.

3. Laser scanner measuring system according to Claim 1,

characterised in

that a retro reflector unit is provided behind the object to be measured, when seen from said scanner unit, which reflects the incident radiation in itself or with a parallel offset so that the beam path reflected back to said scanner/receiver unit is located in a plane which is offset in parallel from the plane which is defined by the scanning direction (the direction in which the laser beam is moved through the measuring field) and the optical axis.

4. Laser scanner measuring system in accordance with the introductory clause of Claim 1 or the Claims 1 to 3,

characterised in

that a dark field stop is disposed in the receiver beam path in the focal point of the optical system of the receiver, behind which said photo detector is provided and the position of the shadow edges is determined on the basis of the point of time by which said photo diode detects a maximum intensity.

5. Laser scanner measuring system according to Claim 4,

characterised in

that the beam path in the optical system of said receiver is split by means of a beam splitter disposed ahead of said dark field stop, and that in the second partial beam path a photo diode is arranged approximately in the focal point of the optical system of said receiver.

6. Laser scanner measuring system in accordance with the introductory clause of Claim 1 or any of the Claims 1 to 5,

characterised in

that a photo diode array (line of photo diodes, photo diode matrix or annular detector) or a position-resolving photo diode is used as photo detector.

7. Laser scanner measuring system according to the Claims 1 to 6,

characterised in

that one or several receiver units or retro reflectors are disposed at an angle different from  $0^\circ$  or  $180^\circ$  relative to the optical axis of the scanner unit in the scanning plane.

8. Laser scanner measuring system according to the Claims 1 to 7,

characterised in

that an optical system is arranged in the scanner beam path for splitting the scanning beam in the direction orthogonal on the scanning direction (e. g. a grid having lines oriented orthogonally with respect to the scanning direction).

9. Laser scanner measuring system according to the Claims 1 to 8,

characterised in

that an optical system is arranged in the scanner beam path for splitting the scanning beam in the direction parallel with the scanning direction (e. g. a grid having lines oriented in parallel with respect to the scanning direction).

10. Laser scanner measuring system according to the Claims 1 to 9,

characterised in

that optical elements are disposed in the illuminating beam path and/or the receiver beam path for radiation of different polarisation (e. g. polarising beam splitters, Wollaston prism, retarding plate and Glan-Thomson Prism).

11. Laser scanner measuring system according to the Claims 1 to 10,

characterised in

that filters selective in terms of wavelength (interference filters, colour filters or cut-off filters) are disposed in the receiver beam path.

12. Laser scanner measuring system according to the Claims 1 to 11,

characterised in

that a reference beam path is realised in the combined scanner/receiver unit, in the outside space or by means of a light guide, which is superimposed by the beam path coming from the object to be measured in such a way that the resulting interference pattern which varies locally and in the course of time is detected by means of at least one detector element.

13. Laser scanner measuring system according to the Claims 1 to 12 for application for control of a production process.